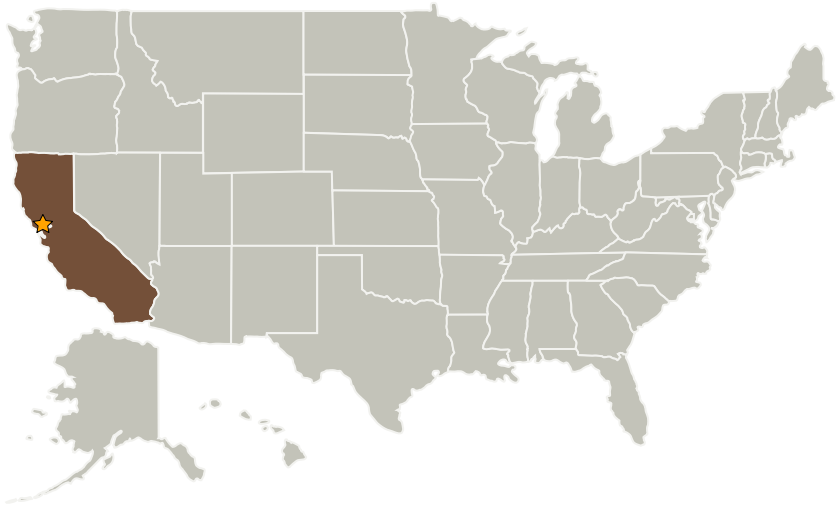
High Specific-Strength C-Zr(O)C / C-Ablator TPS for CEV, Phase II

Completed Technology Project (2007 - 2009)

Project Introduction

During the Phase I NASA SBIR, MATECH GSM (MG) has developed and evaluated the world's first ultra-high temperature (UHT) Zr-(O)-C ceramic fiber pre-form / organic ablative matrix composite TPS system. This Phase II NASA SBIR Proposal from MG seeks to expand this technology to the following areas: 1)Microstructural level refinements and optimization of the char- and ablator phases for more reproducible material systems 2)Scaling-up for the fabrication of a larger and more complex-shape geometry 3)TPS design data generation with extensive arc-jet testing for a full TPS Component demonstration in Phase III. In this TPS material concept, the "char" phase is UHT zirconium carbide (Zr(O)C) ceramic fiber pre-forms, which have dual functions of high compressive strength of ligaments and non-recession of fiber components after matrix ablation. MG's ablative TPS are designed to retain their shape, thereby reducing the thickness requirement and lowering the TPS total mass, crucial at high re-entry velocity. MG's new ablator slowly absorbs high levels of energy during high temperature ablation. At the completion of the Phase II-Base and Phase II-Option program, MG will have fabricated a high specific strength C-Zr(O)C / C-ablator (CZOCA) and have demonstrated one TPS component, operational at > 5000oF.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Ames Research Center (ARC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Ames Research Center(ARC)	Lead Organization	NASA Center	Moffett Field, California
MATECH Advanced Materials	Supporting Organization	Industry	Westlake Village, California

Primary U.S. Work Locations
California

Project Transitions

December 2007: Project Start

December 2009: Closed out

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX14 Thermal Management Systems
  - TX14.3 Thermal Protection Components and Systems
    - TX14.3.1 Thermal Protection Materials